

WE CLAIM:

1. A method of inducing immunity to pneumonic pasteurellosis in ruminants, comprising the step of:

administering a *P. haemolytica* bacterium to a ruminant, wherein the *P. haemolytica* bacterium (a) expresses no biologically active leukotoxin, (b) expresses a form of leukotoxin molecule which is a deletion mutant of about 66 kDa which lacks amino acids 34 to 378 and which induces antibodies which specifically bind to and neutralize biologically active leukotoxin; and (c) contains no foreign DNA, whereby immunity is induced.

2. The method of claim 1 wherein the step of administering is via the oral route.

3. The method of claim 1 wherein the bacterium is top-dressed on the feed of the ruminant.

4. The method of claim 1 wherein the step of administering comprises injecting the bacterium subcutaneously.

5. The method of claim 1 wherein the step of administering comprises injecting the bacterium intradermally.

6. The method of claim 1 wherein the step of administering comprises injecting the bacterium intramuscularly.

7. The method of claim 19 wherein the step of administering is via the nose.

8. A feed for ruminants which comprises a *P. haemolytica* bacterium to a ruminant, wherein the *P. haemolytica* bacterium (a) expresses no biologically active leukotoxin, (b) expresses a form of leukotoxin molecule which is a deletion mutant of about 66 kDa which lacks amino acids 34 to 378 and which induces antibodies which specifically bind to and neutralize biologically active leukotoxin; and (c) contains no foreign DNA.

9. A vaccine for reducing morbidity in ruminants, comprising:
a *P. haemolytica* bacterium (a) expresses no biologically active leukotoxin,
(b) expresses a form of leukotoxin molecule which is a deletion mutant of about 66
kDa which lacks amino acids 34 to 378 and which induces antibodies which
specifically bind to and neutralize biologically active leukotoxin; and (c) contains no
foreign DNA.